

**I-405, SR 520 to SR 522 Stage 1 (Kirkland Stage 1) (Forbes
Lake East) Mitigation Site**

USACE IP 200401410

Northwest Region

2014 MONITORING REPORT

Wetlands Program

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I-405, SR 520 to SR 522 Stage 1 (Kirkland Stage 1) (Forbes Lake East) Mitigation Site

USACE IP 200401410



General Site Information		
USACE IP Number	200401410	
Mitigation Location	East of Forbes Lake in Kirkland, King County.	
LLID Number	1221766476864	
Construction Date	2006-2007	
Monitoring Period	2008-2017	
Year of Monitoring	7 of 10	
Type of Impact	Wetland	Buffer
Area of Project Impact	1.56 acres	2.91 acres
Type of Mitigation	Wetland Establishment	Wetland Enhancement
Area of Mitigation¹	1.628 acres	0.572 acre
Type of Mitigation	Upland Habitat Enhancement	
Area of Mitigation	1.49 acres	

¹Additional wetland acreage provided by two other mitigation sites, including I-405 Forbes Lake West and I-405 Thrasher's Corner. See Appendix 3. Impact acreage source (WSDOT 2005) mitigation acreage source (WSDOT 2008).

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Summary of Monitoring Results and Management Activities (2014)

Performance Standards (Year 10)	2014 Results ²	Management Activities
Site demonstrates adequate wetland hydrology	Not present in all intended areas.	
Aerial cover of native woody species will be at least 80 percent in the forested and scrub-shrub wetlands, of this area no more than 30 percent will be volunteer red alder (<i>Alnus rubra</i>).	85 percent cover of native woody vegetation. 20 percent cover of red alder	
At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 8 percent relative cover for each species in the emergent wetland zone by Year 10.	4 native herbaceous species provide 8 percent or more relative cover	
At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 10 percent relative cover for each species in the forested and scrub-shrub wetland zones by Year 10.	5 native woody species provide 8 percent or more relative cover	
Species identified as King County-listed noxious and obnoxious weeds, including, but not limited to, reed canarygrass, non-native blackberries, purple loosestrife, Scot's broom, and Japanese knotweed will not exceed 20 percent aerial cover in the wetland creation areas. If this cover threshold is exceeded, weed control measures will be implemented. Emergent areas will be planted with trees and shrubs if invasive plant management is unsuccessful in the emergent zones.	2 percent cover of target invasive and noxious species	7 weed control visits occurred in 2013 between January and September; <i>Nanophyes marmoratus</i> released to biologically combat purple loosestrife (<i>Lythrum salicaria</i>) 4 weed control visits occurred in 2014 between April and August
Performance Standards (Year 3)	2014 Results	Management Activities
After three years, aerial cover of emergent (facultative and wetter) plant species will be at least 80 percent in the emergent wetland zone.	70% (CI _{80%} = 58-81%) in area developed as emergent. 40% with open water included.	1000 longhair sedge (<i>Carex comosa</i>), 2000 soft-stem bulrush (<i>Schoenoplectus tabernaemontani</i>), 3000 hardstem bulrush (<i>Schoenoplectus acutus</i>), planted in the fall 2012

² Estimated values are presented with their corresponding statistical confidence interval. For example, 70% (CI_{80%} = 58-81% cover) means we are 80% confident that the true cover value is between 58% and 81%.

Report Introduction

This report summarizes Year-7 monitoring activities at the State Route (SR) 405 Forbes Lake East Mitigation Site. Included are a site description, the performance standards, an explanation of monitoring methods, and an evaluation of site success. Monitoring activities included vegetation surveys, photo-documentation, and assessments of wetland hydrology. Vegetative monitoring occurred on July 2, 2014 and hydrology monitoring occurred on March 10, March 24, and April 14, 2014.

What is the I-405 Forbes Lake East Mitigation Site?

This 3.7-acre mitigation site (Figure 1) was established as partial compensation for impacts to 1.56 acres of wetland and 2.91 acres of buffer due to road improvements along I-405 between State Route (SR) 520 and SR 522. The site was primarily designed to mitigate for lost wetland habitat functions.

Two other mitigation sites provide additional compensation for project impacts: I-405 Forbes Lake West and I-405 Thrasher’s Corner. To view a table detailing mitigation acreage at the three projects, see Appendix 4.

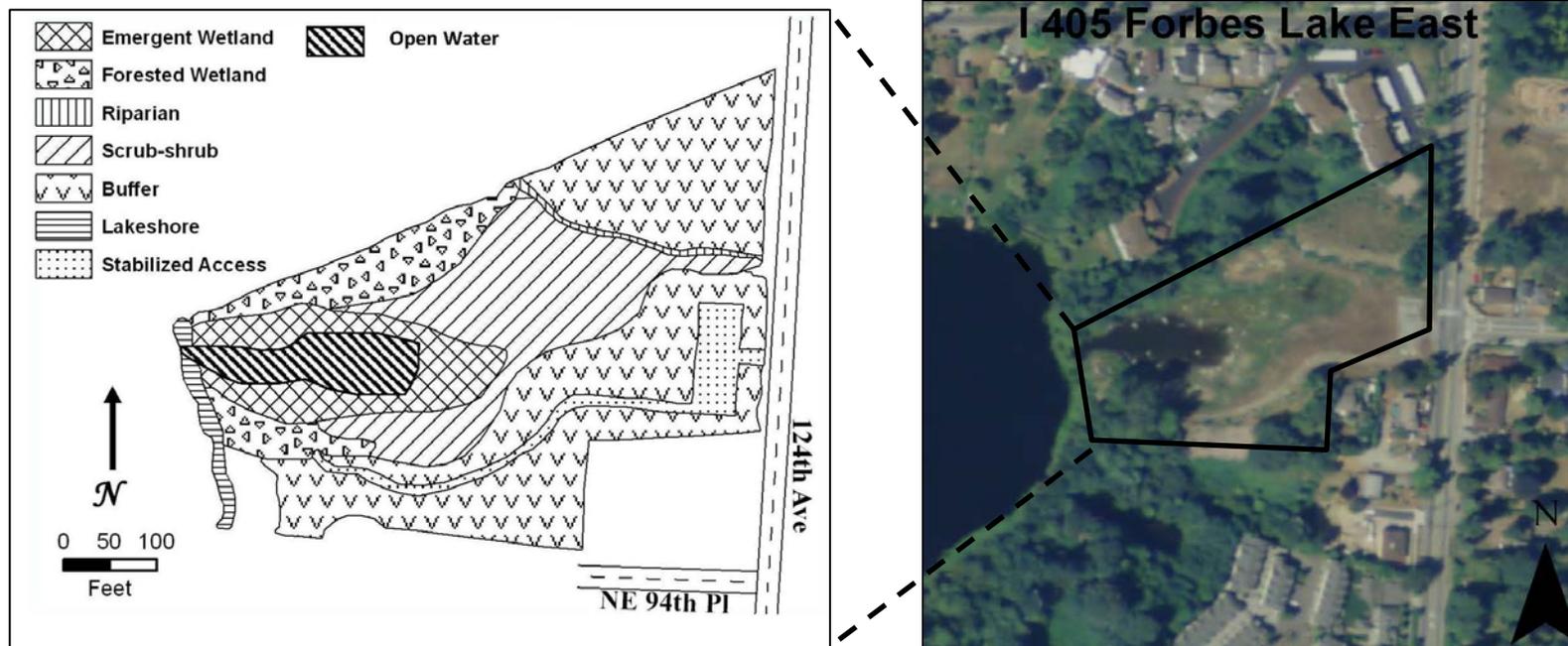


Figure 1 Site Sketch

The I-405 Forbes Lake East Mitigation Site borders Forbes Lake. A low emergent area butts up against the permanently inundated area and is surrounded by forested and scrub-shrub wetland. The eastern side of the site is bisected by an intermittent stream flowing north. A long driveway follows the buffer and provides access to the site. Directions to the site are in Appendix 1.

What are the performance standards for this site?

Year 10 (2017)

Performance Standard 1

Soils will be saturated to the surface, or standing water will be present in a monitoring well at 12 inches below the surface or less for at least two consecutive weeks (five percent) of the growing season in years when rainfall meets or exceeds the 30-year average, or hydrology will be present sufficient to support facultative or wetter vegetative species within the wetland as demonstrated by the vegetative performance measures.

Performance Standard 2

After 10 years, aerial cover of native woody species will be at least 80 percent in the forested and scrub-shrub wetlands, of this area no more than 30 percent will be volunteer red alder.

Performance Standard 3

At least three native, non-invasive facultative or wetter plant species will achieve a minimum of eight percent relative cover for each species in the emergent wetland zone by Year 10.

Performance Standard 4

At least three native, non-invasive facultative or wetter plant species will achieve a minimum of 10 percent relative cover for each species in the forested and scrub-shrub wetland zones by Year 10.

Performance Standard 5

Species identified as King County-listed noxious and obnoxious weeds, including, but not limited to, reed canarygrass, non-native blackberries, purple loosestrife, Scot's broom, and Japanese knotweed will not exceed 20 percent aerial cover in the wetland creation areas. If this cover threshold is exceeded, weed control measures will be implemented. Emergent areas will be planted with trees and shrubs if invasive plant management is unsuccessful in the emergent zones.

Year 3 (2011)

Performance Standard 1

After three years, aerial cover of emergent (facultative and wetter) plant species will be at least 80 percent in the emergent wetland zone.

Appendix 1 shows the planting plan as built (WSDOT 2008).

How were the performance standards evaluated?

WSDOT staff collected hydrology data using methods described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Version 2.0) (USACE 2010) and a Global Positioning System (Trimble Mapping Grade) (Performance Standard 1).

To evaluate the standard for emergent cover, a segmented baseline was established on the north and south side of the open water (Performance Standard 1 (Year-3)) (Figure 2). Eleven sampling transects were randomly placed perpendicular to the baseline. The point intercept method was used to estimate emergent cover (Performance Standard 3). Eleven 4-meter sample units were randomly placed along the sampling transects with a resolution of twenty points.

The cover of native woody vegetation (Performance Standards 2 and 4), and the cover of noxious and invasive species (Performance Standard 5) were estimated qualitatively as there are no formal year-7 vegetation performance standards.

For additional details on the methods, see the [WSDOT Wetland Mitigation Site Monitoring Methods Paper](#) (WSDOT 2008).

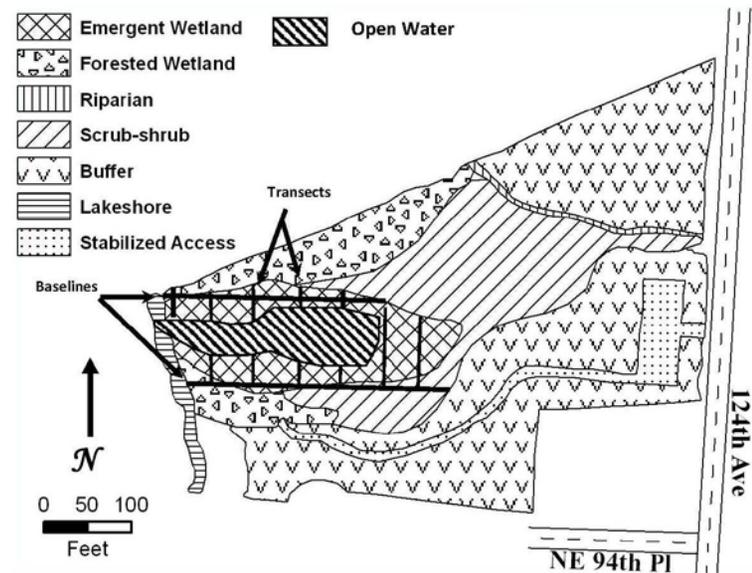


Figure 2 Site Sampling Design (2014)

How is the site developing?

A diverse community of native and non-invasive, non-native emergent plants are established in both the emergent portion of the wetland and in the understory of the forested and scrub-shrub wetland.

The emergent zone has still yet to meet the year-3 performance standard of 80 percent native cover, despite the area being replanted with six thousands plugs in the fall 2012 (Photo 1). Herbivory of the installed plugs by waterfowl has been a major obstacle to establishment of cover in the replanted areas. In an attempt to limit the loss of the plantings, multiple bird deterrents were placed across the site, with questionable success (Photo 2). There is a gradient of cover from lower to higher as you move away from the water's edge. As this area fills in over the next three years of monitoring the emergent zone should readily meet the final year success standard.

The woody vegetation in both the wetland and buffer is well established. The site is currently meeting the native woody vegetative performance criteria and all of the relative cover performance criteria.

The site is intended to provide improved wildlife habitat and it appears that this function is being supported. A total of twenty-seven species of birds have been documented on site. Other incidental wildlife observations include rabbits, raccoons, possums, deer, and garter snakes. Pacific chorus frogs have been observed, as well as egg masses and tadpoles, providing evidence of on-site breeding.



Photo 1
Emergent replant (August 2012)



Photo 2
Waterfowl deterrent (August 2012)

Results for Performance Standard 1

(Site demonstrates adequate wetland hydrology):

Based on our three hydrology visits in the months of March and April, 2012 we did not achieve the hydrology standard this year (Photo 3). During the hydrology monitoring season rainfall was within the range of the 30 year average. A wetland delineation was conducted in the spring of 2011 due to concerns over a lack of hydrology in all the intended areas. The delineation has documented an acreage shortfall within the forested and emergent wetland zones. This corresponds with the area around monitoring well six which has consistently lacked indicators of hydrology. See Appendices 2 and 4.

Results for Performance Standard 2

(Native woody species will achieve 80% cover, no more than 30 percent will be volunteer red alder):

Cover of woody species in the scrub-shrub and forested zone is estimated to be 85 percent (Photo 4). Red alder (*Alnus rubra*) comprises 20 percent of the relative cover.

Results for Performance Standard 3

(3 native facultative or wetter vegetation species will achieve 8% relative cover in the emergent zone):

The following species have achieved at least eight percent cover: soft rush (*Juncus effusus*), marsh seedbox (*Ludwigia palustris*), needle spikerush (*Eleocharis acicularis*), woolgrass (*Scirpus cyperinus*), tapertip rush (*Juncus acuminatus*), and jointleaf rush (*Juncus articulatus*).



Photo 3
Inundation in the emergent zone (March 2014)

Results for Performance Standard 4

(3 native facultative or wetter vegetation species will achieve 10% relative cover in the PSS and PFO zones):

The following species achieved greater than tent percent cover: Pacific willow (*Salix lucida ssp. lasiandra*), Sitka willow (*Salix sitchensis*), red alder (*Alnus rubra*), and Nootka rose (*Rosa nutkana*).

Results for Performance Standard 5

(Targeted non-native invasive species will not exceed 20% cover in the creation zone):

The cover of target invasive and noxious species in the created wetland is qualitatively estimated at two percent. Yellow flag iris (*Iris pseudacorus*) and reed canarygrass (*Phalaris arundinacea*), both Washington State class C weeds and King County non-regulated noxious weeds were observed in the wetland. Several weed control visits occurred in both 2013 and 2014 and will continue in 2015.

Results for Performance Standard 1 (Year 3)

(Native facultative or wetter species will achieve 80% cover)

Cover of native facultative or wetter species in the 0.43 acres emergent zone that was sampled is 70% ($CI_{80\%} = 58-81\%$) (Photo 5). If the 0.28 acres of open water is included emergent cover is estimated at 40 percent. A total of 16 separate native species were present within the sampled area. See Appendices 1 and 2 for maps of emergent area sampled.



Photo 4
Woody cover in the forested and scrub-shrub wetland (July 2014)



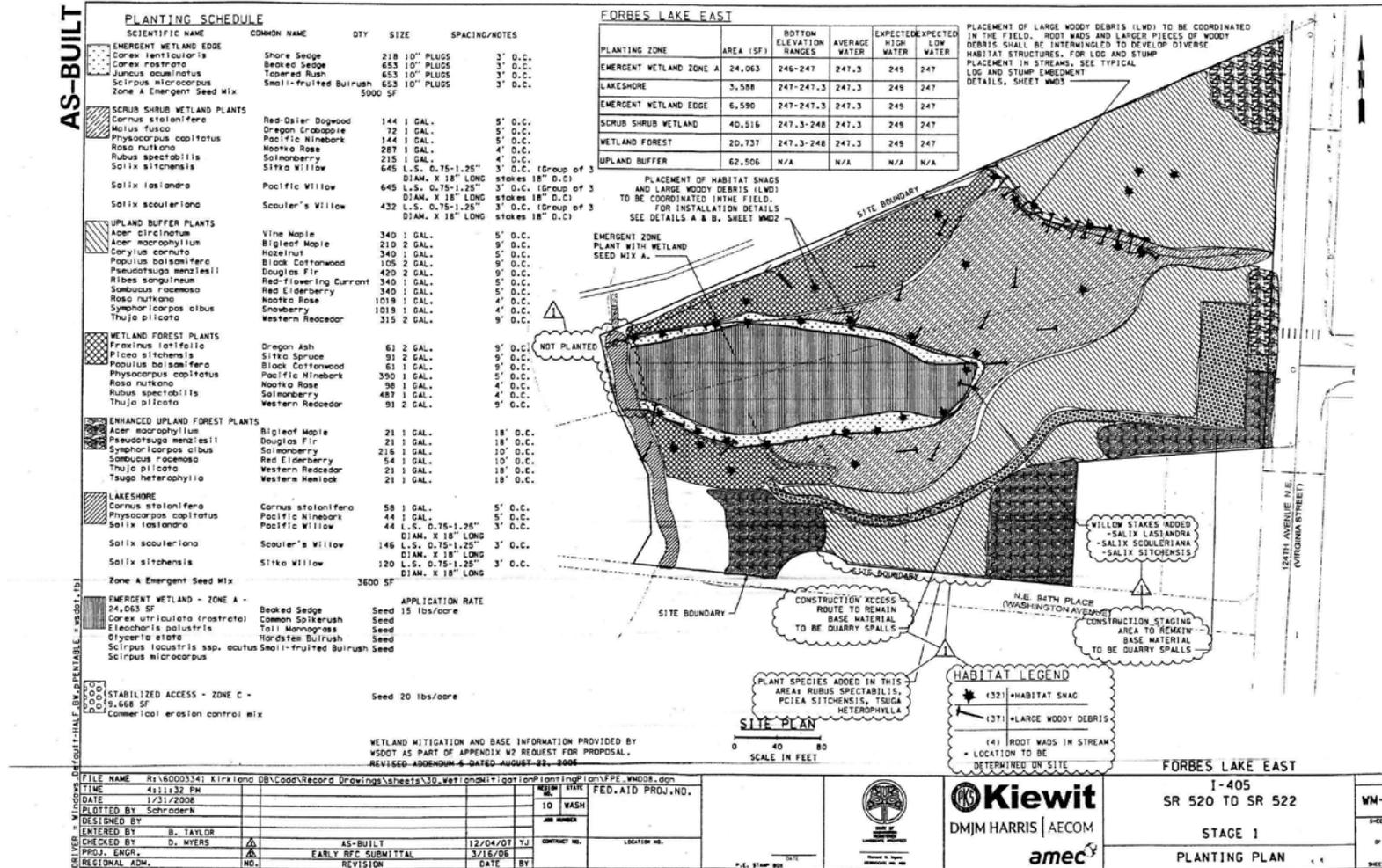
Photo 5
Emergent cover (July 2014)

What is planned for this site?

The region has committed to planting aquatic bed species in an effort to vegetate the areas of open water that have been reluctant to establish a vegetative layer. Ongoing weed control in 2015 will be conducted as needed.

Appendix 1 – Planting Plan As-Built

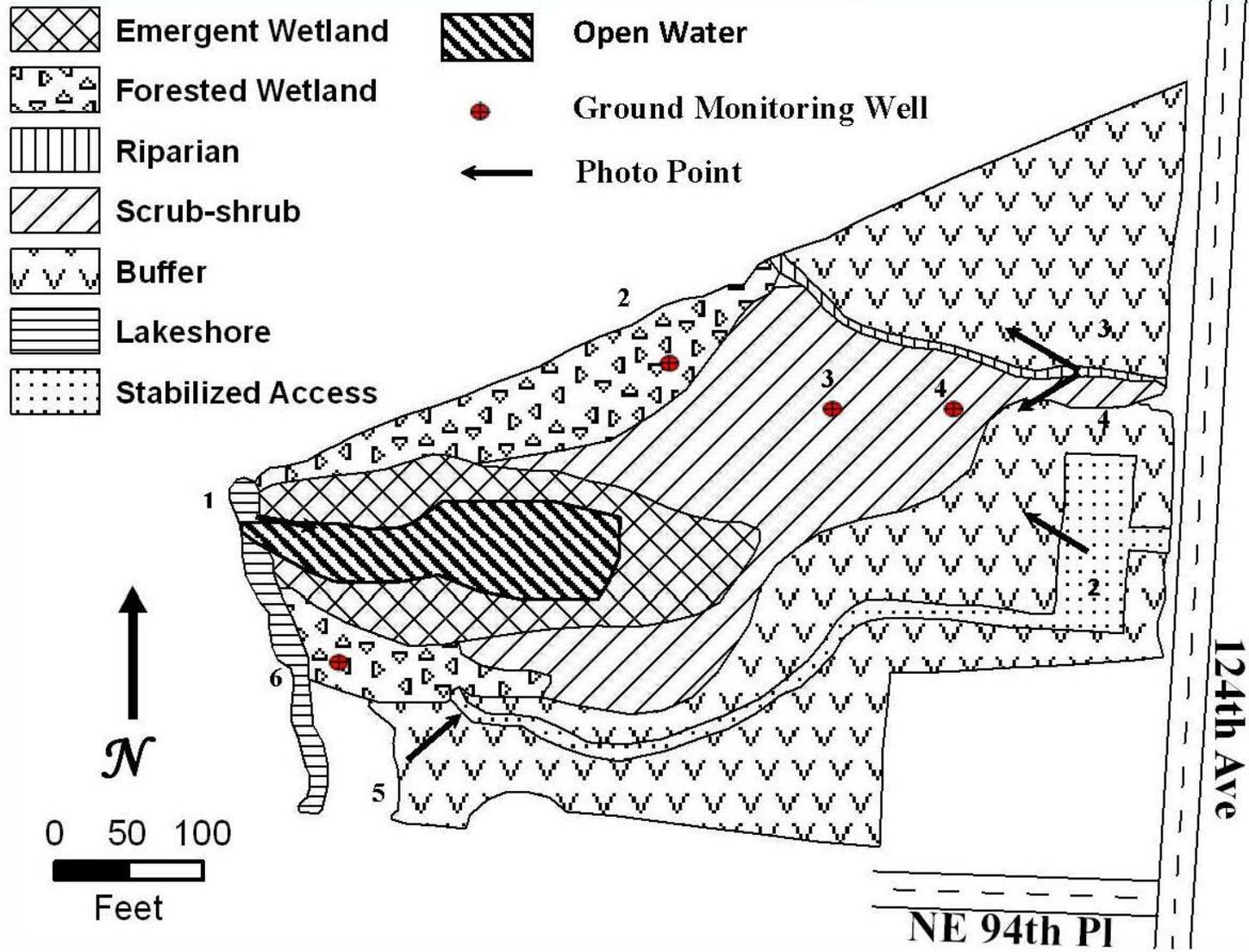
(from WSDOT 2008)



Driving Directions:

Follow I-5 to I-405. Exit at NE 85th Street. At the end of the ramp, turn right (east). At the third intersection, travel north on 124th Street NE. The site is west of the intersection of 95th Street NE and 124th Street NE.

Appendix 2 – Photo Points and Ground Monitoring Well Map



Appendix 3 – Photo Points

The photographs below were taken from permanent photo-points on July 2, 2014 and document current site development.



Photo Point 1



Photo Point 2

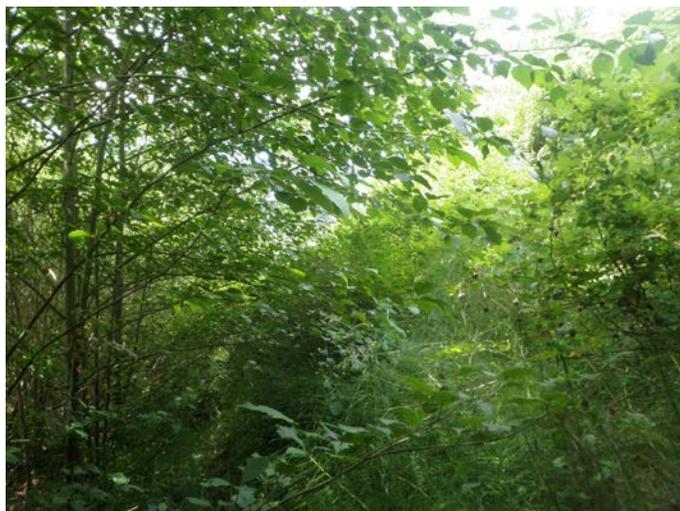


Photo Point 3



Photo Point 4

The photographs below were taken from permanent photo-points on July 2, 2014 and document current site development.



Photo Point 5

Appendix 4 – Data Tables

Table 1 Constructed Mitigation Acreage at Wetland Mitigation Sites Associated with the I-405, SR 520 to SR 522 Stage 1 (Kirkland Stage 1) Project

Site	Mitigation Type	Proposed	Changes	Constructed
Forbes Lake West	Creation	0.56	-0.30	0.26
	Enhancement	0.86	-0.40	0.46
	Preservation	0.74		0.74
	Buffer/upland	0.05	0.70	0.75
Forbes Lake East	Creation	1.62		1.62
	Enhancement	0.57		0.57
	Buffer/upland	1.49		1.49
Thrashers Corner	Creation	0.21	-0.07	0.14
	Enhancement	0.72		0.72
	Preservation	3.22		3.22
	Buffer/upland	0.00	0.07	0.07

Table 2 Hydrology Observations

Date	Surface Observations	Water Level (inches below soil surface unless otherwise noted)	
March 10, 2014	PEM and PSS inundated	Well 2	2.5"
		Well 3	2.5"
		Well 4	Saturated to the surface
		Well 6	17.5"
March 24, 2014	All PEM and PSS areas inundated or saturated to the surface.	Well 2	Saturated to the surface (18").
		Well 3	0.5"
		Well 4	Saturated to the surface
		Well 6	Dry to the bottom of the well.
April 14, 2014	PEM inundated	Well 2	6"
		Well 3	Saturated to the surface
		Well 4	Saturated to the surface
		Well 6	Dry to the bottom of the well (18").

Table 3. Comparison of Observed and Normal Precipitation (NRCS 1997)

Monthly precipitation data for Seattle Tacoma International Airport, Washington.

		Long-term rainfall records ^a							
		3 yrs. in 10 less than	Average	3 yrs. in 10 more than	Rain fall ^a	Condition dry, wet, normal ^b	Condition Value	Month weight value	Product of previous two columns
1 st prior month	March	2.71	3.75	4.42	9.44	W	3	3	9
2 nd prior month	Feb	2.65	4.18	5.04	6.11	W	3	2	6
3 rd prior month	Jan	3.50	5.13	6.12	3.7	N	1	1	1
								Sum	16

^aNRCS 2014

^bConditions are considered normal if they fall within the low and high range around the average.

Note: If sum is

- 6 - 9 then prior period has been drier than normal
- 10 - 14 then period has been normal
- 15 - 18 then period has been wetter than normal

Condition value:

- Dry (D) =1
- Normal (N) =2
- Wet (W) =3

Conclusions: Wetter than normal precipitation conditions were present prior to hydrology monitoring visits.

Literature Cited

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4. [WSDOT] Washington State Department of Transportation.2008. I-405, SR 520 to SR 522 Stage 1 (Kirkland Stage 1) As-Built Planting Plan. WSDOT Urban Corridors Office, Bellevue, WA.
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